A Section 508–conformant HTML version of this article is available at http://dx.doi.org/10.1289/ehp.1408936 and http://dx.doi.org/10.1289/ehp.1408936R.

The correspondence section is a public forum and, as such, is not peer-reviewed. EHP *is not responsible for the accuracy, currency, or reliability of personal opinion expressed herein; it is the sole responsibility of the authors.* EHP *neither endorses nor disputes their published commentary.*

Policy and the Transparency of Values in Science

http://dx.doi.org/10.1289/ehp.1408936

I read with interest the article "Science Policy, and the Transparency of Values" (Elliott and Resnik 2014) and wanted to make a few comments and observations.

First, the authors noted that different levels of scientific evidence are necessary depending on the venue in which that evidence is going to be used: High standards of evidence are necessary to infer causal relationships, with weaker standards of evidence required to protect the public from perceived risks. Although I agree that different venues or contexts require different standards of evidence, it is important to emphasize that the actual scientific evidence remains constant. For example, anecdotal evidence is the weakest level of scientific evidence on the hierarchy, regardless of the context in which it is being employed. There might be a legitimate rationale to relax the level of evidence required to inform policy within a given context, but that does not change the nature of the evidence itself. If we rely on "weaker" standards of evidence to protect the public, the basis of the decision and the nature of the evidence relied upon should be made transparent. This is not always the case.

Second, the authors combined tort law and chemical regulations as examples in which weaker standards of evidence can suffice to inform policy. I disagree with treating these two venues as equivalent. Rather, tort law should be part of the first venue: inferring causal relationships. After all, the goal of a civil tort is to prove that a chemical causes the alleged injury. Legal tort cases are not intended to be theoretical or precautionary exercises.

Third, in the "Discussion" of their paper, Elliott and Resnik (2014) pointed out that when authors have ties to regulated industries, these relationships could serve to influence the interpretation of findings and the conclusions drawn. Fair enough. But Elliott and Resnik failed to emphasize that financial ties to industry are only one type of conflict of interest. For example, ideological ties to advocacy organizations are another strong source of potential conflict of interest that could adversely influence the use of science in the interest of public policy. When using science to inform policy, transparency is critical. However, this transparency should include not only financial ties to industry but also ties to advocacy organizations and other strongly held points of view.

Finally, it seems incomplete to assess the role of science in public policy without a discussion of the importance of evaluating risk–benefit relationships. Clearly, society is willing to tolerate health risks from certain chemical exposures when those risks are deemed to be outweighed by the benefits. This risk–benefit assessment is made every time a new drug is considered for approval. In this context, policy makers are willing to tolerate great risk if the benefits of a pharmaceutical agent are deemed to outweigh the risks (and if the appropriate warnings are made). Conversely, policy makers are appropriately unwilling to tolerate health risks when the benefits are minimal or inadequately defined. Characterizing the risk–benefit relationship is critical to setting rational and appropriate public policy. Any discussion of the role of science in this endeavor is inadequately served without discussing these important relationships.

I am a scientific consultant who works with commercial manufacturers to help them understand the science related to their products. I have a deep and enduring respect for rigorous scientific inquiry using the best and most appropriate scientific principles. These principles and methodologies are clearly defined and should be carefully and systematically applied before using scientific findings to influence policy (e.g., Rooney et al. 2014). The nature of the available scientific evidence does not change based on the context in which it is applied. It is ultimately the job of policy makers to review the scientific evidence rigorously and systematically. Policy should then be set according to a set of rules that is consistent, rational, and transparent; free of conflict; and informed by the available science.

D.H.S. is the owner of a scientific consulting company, Innovative Science Solutions, LLC, which performs work on behalf of life sciences clients on a fee-for-services structure. The author was not paid by any client for work on this letter.

David H. Schwartz

Innovative Science Solutions, LLC
Morristown, New Jersey, USA
E-mail: schwartz@innovativescience.net

References

Elliott KC, Resnik DB. 2014. Science, policy, and the transparency of values. Environ Health Perspect 122:647–650; doi:10.1289/ehp.1408107.

Rooney AA, Boyles AL, Wolfe MS, Bucher JR, Thayer KA. 2014. Systematic review and evidence integration for literature-based environmental health science assessments. Environ Health Perspect 122:711–718; doi:10.1289/ehp.1307972.

Transparency of Values in Science: Elliott and Resnik Respond

http://dx.doi.org/10.1289/ehp.1408936R

We thank Schwartz for his thoughtful comments, which provide an opportunity for us to clarify some of the points in our commentary, in which we called for greater transparency about the values that influence policy-relevant research (Elliott and Resnik 2014). His first concern is that even though we call for employing different standards of evidence in various social contexts, the evidence itself remains the same. We agree; in our commentary we were not claiming that the evidence itself changes but only that the form of evidence required for different decisions depends on the social context. Nevertheless, it is important to recognize that although the evidence itself does not change, it has to be interpreted and weighed, and many contemporary science policy disputes stem from disagreements about how to do so (Douglas 2012). Therefore, our view is that conflicts over public policies often stem from value judgments about both the nature of the evidence and standards of evidence. We agree with Schwartz about the solution: Transparency is essential. The more scientists acknowledge the assumptions and values that influence their interpretations of evidence and their decisions about how to weigh it, the better.

Schwartz's second point is that it is problematic for us to treat tort law and chemical regulations as equivalent contexts, in which weaker standards of evidence can appropriately inform policy. We agree that different standards of evidence may be appropriate in the two contexts. However, we caution against equating the standards of evidence expected in tort law with those expected in more traditional scientific contexts. The tort system requires only a preponderance of evidence (> 50% likelihood) to win a case; this is much weaker evidence than scientists typically demand when presenting or publishing results, and confusion about these differing standards has led to significant legal controversies (Cranor 2006).

Schwartz's third point is that other conflicts of interest, such as "ideological ties to advocacy organizations," are important to disclose in addition to financial ties to industry. We heartily agree; indeed, in our commentary (Elliott and Resnik 2014) we stated that "Disclosures of competing financial interests and nonfinancial interests (such as professional or political allegiances) also provide opportunities for more transparent discussions" (Elliott and Resnik 2014). One of the aims of our commentary was to encourage more careful thinking about

how to promote transparency regarding a wide range of different factors that could influence scientists' reasoning, including ideology. Nevertheless, there are at least two reasons that financial connections to industry groups should continue to receive careful attention: *a*) Advocacy organizations typically have much fewer resources than industry to generate policy-relevant research that serves their interests (Elliott 2011); and *b*) a large body of evidence indicates that industry funding has important effects on research outcomes, whereas there is less information about how ideological ties affect research (e.g., Lundh et al. 2012).

Schwartz's fourth concern is that it is important to think about risk–benefit relationships when applying science to public policy. This is a very good point, but it needs to be considered in conjunction with the fact that scientists' values and assumptions may influence their assessments of the evidence. It would be ideal if scientists could provide perfectly unbiased risk assessments to policy makers, who could then evaluate the risks versus the benefits in order to make policy decisions. Unfortunately, this picture is unrealistic; scientists' views about the benefits associated with new technologies likely have implicit influences on their risk assessments. For example, evidence from the literature on risk perception indicates that people's perceptions of risk are influenced by a number of factors, including the voluntariness of the risks, the fairness of their distribution, their familiarity, and the perceived benefits associated with them (Fischhoff et al. 1981). Scientists are subject to these same influences, especially when they have limited data or are forced to weigh multiple forms of evidence (Cooke 1991). This provides further support for our central claim, namely, that scientists should explore ways to acknowledge the values that may influence them rather than denying the presence of these influences.

This letter is the work product of an employee of the National Institute of Environmental Health Sciences (NIEHS), National Institutes of Health (NIH). However, the statements, opinions, or conclusions presented here do not necessarily represent the statements, opinions, or conclusions of the NIEHS, NIH, or the U.S. government.

The authors declare they have no actual or potential competing financial interests.

Kevin C. Elliott[1] and David B. Resnik[2]

[1]Michigan State University, East Lansing, Michigan, USA; [2]National Institute of Environmental Health Sciences, National Institutes of Health, Department of Health and Human Services, Research Triangle Park, North Carolina, USA
E-mail: kce@msu.edu

References

Cooke R. 1991. Experts in Uncertainty: Opinion and Subjective Probability in Science. New York:Oxford University Press.

Cranor C. 2006. Toxic Torts: Science, Law, and the Possibility of Justice. New York:Cambridge University Press.

Douglas H. 2012. Weighing complex evidence in a democratic society. Kennedy Inst Eth J 22(2):139–162.

Elliott K. 2011. Is a Little Pollution Good for You? Incorporating Societal Values in Environmental Research. New York:Oxford University Press.

Elliott KC, Resnik DB. 2014. Science, policy, and the transparency of values. Environ Health Perspect 122:647–650; doi:10.1289/ehp.1408107.

Fischhoff B, Lichtenstein S, Slovic P, Keeney D. 1981. Acceptable Risk. Cambridge, UK:Cambridge University Press.

Lundh A, Sismondo S, Lexchin J, Busuioc OA, Bero L. 2012. Industry sponsorship and research outcome. Cochrane Database Syst Rev 12:MR000033; doi:10.1002/14651858.MR000033.pub2.